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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/616.693

07/10/2003

Michel J.F. Digonnet

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20995

7590

08/25/2006

KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER

CHIEM, DINH D

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 08/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/616,693

Applicant(s)

DIGONNET, MICHEL J.F.

Examiner

Erin D. Chiem

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2006.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 49-57 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-15 and 49-57 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

In view of the Pre-Brief Conference Request filed on May 8, 2006 and the Pre-Appeal Brief Conference Decision, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 10-15, 49-51-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergh et al. (US 4, 773,759 “Bergh” hereinafter) in view of Greenway et al. (US 6,389,187 B1 “Greenway” hereinafter) and The Free Dictionary by Farlex (<http://encyclopedia.thefreedictionary.com/Photonic-crystal+fiber>).

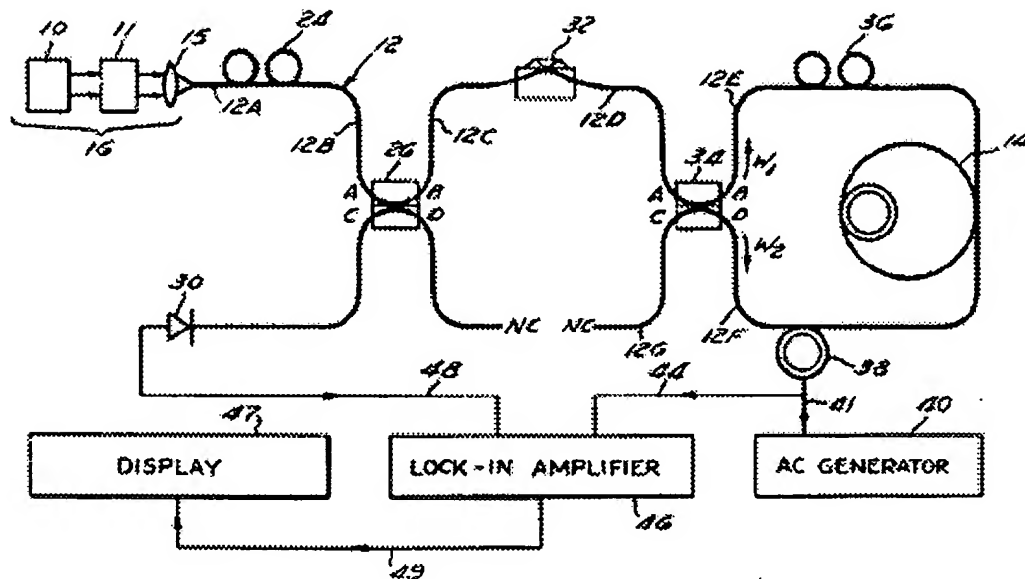
As to claims 1 Bergh discloses (entire patent, especially Fig. 1) an optical sensor comprising:

a broadband light source (‘10’ and col. 5, lines 35-37) having an output that emits a first optical signal;

a first directional coupler (34) comprising at least a first port, a second port and a third port (W_1 and W_2 and 14), the first port optically coupled to the light source to receive the first optical signal emitted from the light source, the first port optically coupled to the second port and to the third port such that the first optical signal received by the first port is split into a second optical signal output by the second port and a third optical signal output by the third port;

a fiber optically coupled to the second port and to the third port to form an optical loop such that the second optical signal and the third optical signal counter propagate through the fiber and return to the third port and the second port, respectively, and an optical detector (30)

located at a position in the optical sensor to receive the counter propagating second and third optical signals after the second and third optical signals have traversed the fiber;



moreover regarding claims 11-15 the optical sensor further comprising an amplitude and frequency modulator that is external to the light source (38);

moreover regarding claims 49-51, Bergh teaches a second directional coupler (26) coupling to the first port of the first directional coupler, and the third port of the second directional coupler is optically coupled to a non-reflective termination; wherein a polarizer (32) is optically connected to the second port of the second directional coupler and to the first port of the first directional coupler, wherein the second directional coupler comprises a fourth port that is optically coupled to a photodetector (30).

However, Bergh does not disclose a hollow band gap fiber optically connecting the second and third port; furthermore, Bergh does not disclose the limitations of claims 2. Nor does Bergh disclose the photonic bandgap fiber comprises a hollow core.

Greenway discloses an optical sensor comprising a broadband light source having a spectral distribution with a full width at half maximum at 18 nanometer (col. 4, lines 55-57) and (col. 6 line 65 – col. 7 line 3); a directional coupler having at least three ports wherein the first port is coupled to the light source and split the signal and transmits them into a second and third port (col. 5, line 22-31); a hollow core photonic bandgap fiber having a hollow core surrounded by a cladding (col. 4, line 29-35, 44-45) confining the counter propagating second optical signal and third optical signal within the hollow core (col. 5, line 67-col. 6, line 14); and an optical detector position to receive the signal from the second and third port (col. 4, line 58-col. 5, line 17). For clarification purpose, the photonic crystal fiber is a generic term describing micro structured glass fibers, which may have a hollow core or a plurality of hollow cores. This is a well-accepted term in the art. An attached definition of the term is included in the office action. Greenway's purpose for using a photonic crystal fiber as an alternative is for its compact size and reduced crosstalk characteristics (col. 4, lines 44-49).

The Free Dictionary by Farlex ("Farlex" hereafter) credited Phillip Russell to the demonstration of a solid and a hollow core photonic bandgap fiber as being the two commonly known types of photonic bandgap fibers. Furthermore, Farlex discloses the photonic bandgap fiber is made of a silica-based material and the bandgap is a series of periodic features. According to Farlex, polarization maintaining photonic bandgap fiber is a mere manipulation of

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the refractive index difference between the core and the cladding and Bragg gratings are also etchable to the cladding of the photonic bandgap fiber.

Since Bergh, Greenway, and Farlex are both from the same field of endeavor, the purpose disclosed by Greenway and Farlex would have been recognized in the pertinent art of Bergh.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to recognize the benefits disclosed by Greenway and replace the solid core portion of Bergh's sensor to replace it with the new photonic bandgap fiber. Furthermore, one having ordinary skill in the art would understand the combined teachings of Bergh, Greenway, and Farlex suggests that a solid core photonic bandgap fiber would be modifiable with a hollow core photonic bandgap fiber. The motivation for using the photonic bandgap fiber is, as disclosed by Greenway, for the fiber's high transmission efficiency, compact size, and reduced crosstalk; furthermore, a highly desired characteristic of a photonic bandgap fiber is its low sensitivity to temperature thus allowing the sensor to be used in highly fluctuated temperature environment.

Claims 3-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergh and Greenway as applied to claims 1 and 2 above, and further in view of Michal et al. (US 6,108,086 "Michal" hereinafter).

Bergh and Greenway discloses all of the limitations of an optical sensor of claims 1 and 2; however, Bergh and Greenway do not teach the light source mean wavelength is stable at least $\pm 0.1 - \pm 100$ parts per million.

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Michal disclose an optic gyroscopes comprising a broadband source comprising a super luminescent fiber source, erbium doped fiber, having bandwidth of 8 nm reduces the centroid wavelength shift to less than 0.1 ppm from 500 ppm for the purpose of preserving the integrity of the broadband fiber light signal. In harsh environments, when Erbium doped fiber is exposed to ionizing radiation, the broadband fiber source loses the wide spectral width, therefore maintaining the light source mean wavelength stability at the various range from ± 0.1 - ± 100 parts per million is critical in preserving the signal integrity and the broad spectrum of the light source.

Since Bergh, Greenaway, and Michal are all from the same field of endeavor, the purpose disclosed by Michal would have been recognized in the pertinent art of Bergh and Greenaway. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide bandpass filters centered at 1557 nm having a bandwidth of 8 nm reduces the centroid wavelength shift to less than 0.1 ppm from previously observed stability at 500 ppm. **The motivation** for maintaining the centroid wavelength stability at fractional ppm allows the broadband light source to maintain the broad spectrum of light since Erbium doped fiber is sensitive to exposure to ionizing radiation.

Response to Arguments

Applicant's arguments filed May 8, 2006 have been fully considered but they are not persuasive. Applicant's argument regarding Greenway's disclosure of a photonic bandgap fiber does not teach a hollow core photonic bandgap fiber is not persuasive. Firstly, examiner provided fundamental definition of the photonic bandgap fiber by The Free Dictionary by Farlex

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to clearly show the prima facie case of obviousness. Secondly, applicant's argument is not evidence that would overcome the test of obviousness, such as providing unexpected results.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin D. Chiem whose telephone number is (571) 272-3102. The examiner can normally be reached on Monday - Thursday 9AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Erin D Chiem
Examiner
Art Unit 2883



Frank G. Font
Supervisory Patent Examiner
Technology Center 2800